Descriptions of First-Instar Larvae of Aedes aurifer (Coquillett) and Aedes grossbecki Dyar & Knab[1] (Diptera: Culicidae)

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The need for identifying all of the larval stages of mosquitoes has been stressed by Price (1960) and Dodge (1966). Dodge (1966) has presented keys and descriptions for first-instar larvae of many of the North American genera and species as well as keys to later instars (2nd to 4th instars) for Eastern North America (Dodge, 1963).

Comparative regional keys to first-instar *Aedes* species in North America have been published by Price (1960) for Minnesota and by Bohart (1954) for California. Other papers which include descriptions of first-instar species of *Aedes* in North America are as follows: Hearle (1929), Abdel-Malek (1949), Lake (1963) and Knight (1964).

Twenty species of *Aedes* are presently known from Delaware. All but two of these (*A. aurifer* and *A. grossbecki*) are described in references cited above. The present paper describes and figures the first-instar larvae of these two species.

Both *A. aurifer* and *A. grossbecki* are univoltine, the larvae hatch from eggs in February and March in Delaware and the adults emerge in May and June. *A. aurifer* is a relatively rare species but *A. grossbecki* is common except in Sussex County, Delaware.

To determine if Delaware specimens of first-instar *Aedes* conform to the published descriptions from other areas, larvae are being collected and a key will then be presented for the State for the twenty species.

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Procedure

Methods for collecting females, obtaining eggs and mounting larvae are essentially the same as described by Lake (1963), the only difference in procedure being the conditioning of eggs. Since *A. aurifer* and *A. grossbecki* are univoltine species, conditioning similar to that described by Horsfall and Fowler (1961) was employed. Eggs were allowed to remain at summer temperature for three to four months (June to September), then refrigerated at about 4° C for three months and finally a short, post-cold, warm period of one to three days. The eggs were then inundated in nutrient broth media and the resulting larvae killed 24 to 48 hours after emergence.

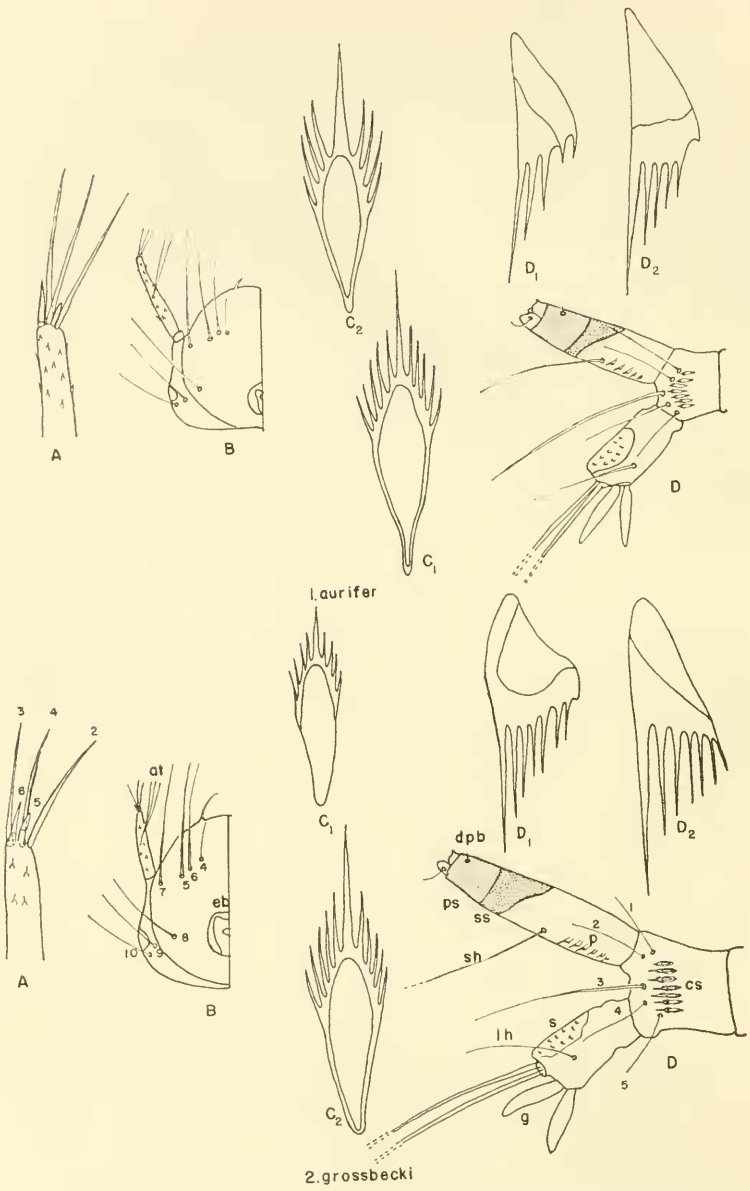
Aedes aurifer (Coquillet) (Fig. 1)

Head: Hairs single, postclypeal 4 distinctly posterior to a line drawn through base of upper head hair 5 and lower head hair 6 on same side. Antennal ratio (antenna: midline of head) 1:1.5. Antennal tuft double or triple; antennal hairs 2, 3, and 4 approximately equal, 5 shorter than 6. Antennae heavily spiculate.

Terminal Segments: Comb scales six to eight usually six or seven ($\bar{x} = 6.7$) individual scale with long terminal spine followed by a series of shorter spines. Pentad hair 3 very long, extending past end of siphon; heavier and much longer than other pentad hairs. Siphon ratio 3.2:1–4.4:1. Pecten teeth four to seven usually 4 or 5 ($\bar{x} = 4.9$). Siphon hair single. The dorsal preapical bristle fine, difficult to see, shorter than apical pecten tooth; located on middle third of the primary zone of sclerotization. Primary zone of sclerotization (width:length) 11:1.0–1:1.6 ($\bar{x} = 1:1.33$).

Comments: The extreme length of pentad hair 3 which extends past the apex of the siphon should be a useful diagnostic character. In Dodge's key (1966) this species would key out to couplet 33 where it could be separated by the position of the dorsal preapical setule (bristle).

Specimens Examined: Sixteen specimens were examined. These larvae were reared from eggs of females collected May



FIGURES 1–2. *Aedes aurifer* and *A. grossbecki* first-instar larvae. The labels in Figure 2 apply to both drawings.

21 and 27, 1963, at Glasgow and May 25, 1964, Blackbird, Delaware.

Aedes grossbecki Dyar & Knab (Fig. 2)

Head: Hairs single, upper lower and preclypeal usually in a straight line. Antennal ratio 1:2.0–1:2.5 ($\bar{x} = 2.2$). Antennal hairs 2, 3, and 4 approximately equal, 5 shorter than 6. Antenna moderately spiculate.

Terminal Segments: Comb scales 6 to 8, usually 7 or 8 ($\bar{x} = 7.2$), individual scale with long terminal spine followed by a series of shorter spines. Pentad hair 3 longer and stouter than other pentad hairs. Siphon ratio about 3.5:1. Pecten teeth 5 to 8 ($\bar{x} = 6.7$). Siphon hair single. The dorsal preapical bristle shorter than apical pecten tooth, located on apical third of the primary zone of sclerotization. Primary zone of sclerotization 1:1–1:1.1 ($\bar{x} - 1.0$).

Comments: Using keys by Dodge (1966) this species would key out to couplet 32 which includes *A. bicristatus* Thurman & Winkler and *A. rustics* (Rossi). Both of these species have pecten teeth beyond the siphonal hair, whereas *A. grossbecki* does not. Therefore this is a good character for separation. In addition, *A. bicristatus* occurs only in California and *A. rusticus* is a European species so that distribution range alone could be used for separating first-instar *A. grossbecki* from the other two species.

Specimens Examined: A total of 12 specimens was examined. Nine of these were exuviae of reared associations from speci-

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FIG. 1. A. Terminal portion of antenna. B. Head, dorsal view, left half. C_1, Comb scale, near middle; C_2, Comb scale at end of row. D. Terminal segments. D_1, Distal pecten tooth; D_2, Penultimate pecten tooth.

FIG. 2. A. Terminal portion of antenna: 2, inner subapical hair; 3, outer subapical hair; 4, dorsal median terminal hair; 5, hyaline process; 6, dorsal external finger process. B. Head, dorsal view, left half: at, antennal tuft; eb, egg burster; 4, postclypeal hair; 5. upper head hair; 6, lower head hair; 7, preantennal hair; 8, sutural hair; 9, transsutural hair; 10, supraorbital hair. C_1, Comb scale, near middle; C_2, Comb scale near end of row. D. Terminal segments: dpb, dorsal preapical bristle; cs, comb scale; g, anal gills; lh, lateral hair; ps, primary sclerotized ring; s, saddle; sh, siphon hair; ss, secondary sclerotized ring; 1–5, pentad hairs; D_1, Distal pecten tooth; D_2, Penultimate pecten tooth.

mens collected at Summit, Delaware on March 8, 1963. The remaining three whole larvae were from eggs of females collected at Thompsonville and Cooch's Bridge, Delaware, during July 1964.

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